Ordering number: EN1513D

Monolithic Linear IC

SANYO No.1513D

LA3600

5-BAND GRAPHIC EQUALIZER

Applications

- Portable component stereos, tape-recorders, radio-cassette recorders, car stereos.

Features

- On-chip one operational amplifier
- 5-band graphic equalizer for one channel can be formed easily by externally connecting capacitors and variable resistors which fix f_o (resonance frequency).
- Series connection of two LA3600's makes multiband (6 to 10 bands) available.
- Highly stable to capacitive load.

Maximum Ratings at Ta=25°C

			unit
Maximum Supply Voltage	V_{CC} max	20	V
Allowable Power Dissipation	Pd max	300	mW
Operating Temperature	Topr	-20 to +75	°C
Storage Temperature	Tstg	-40 to +125	°C

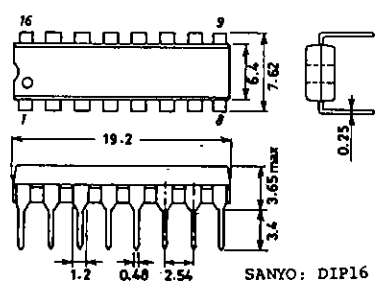
Operating Conditions at Ta=25°C

			unit
Recommended Supply Voltage	V_{CC}	8	V
Operating Voltage Range	V_{CC} op	5 to 15	V

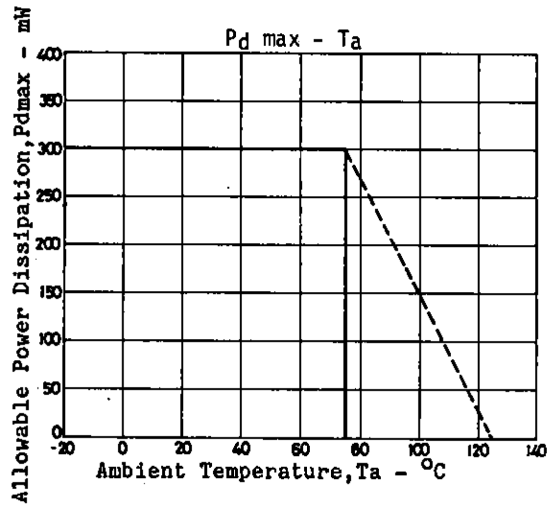
Operating Characteristics at Ta=25°C, V_{CC}=8V, R_L=10kohms, Rg=600ohms, See specified Test Circuit.

				min	typ	max	unit
Quiescent Current	Icco			3.0	5.0	8.0	mA
Voltage Gain	VG	f=1kHz, Vin=-10dB at all flat mode		-3.8	0.8	+2.2	dB
Boost Amount	BOOST	f=100Hz	v_o=-10dB is taken as 0dB at all flat mode at f=1kHz.	8	10	12	dB
		f=340Hz		8	10	12	dB
		f=1kHz		8	10	12	dB
		f=3.4kHz		8	10	12	dB
		f=10kHz		8	10	12	dB
Cut Amount	CUT	f=100Hz		-12	-10	-8	dB
		f=340Hz		-12	-10	-8	dB
		f=1kHz		-12	-10	-8	dB
		f=3.4kHz		-12	-10	-8	dB
		f=10kHz		-12	-10	-8	dB
Total Harmonic Distortion	THD	f=1kHz, v_o=1.0V			0.03	0.1	%
Output Noise Voltage	V_{NO}	Rg=0, All flat B.P.F. 10Hz to 30kHz			2.0	20	uV

Package Dimensions
(unit: mm)
3006B



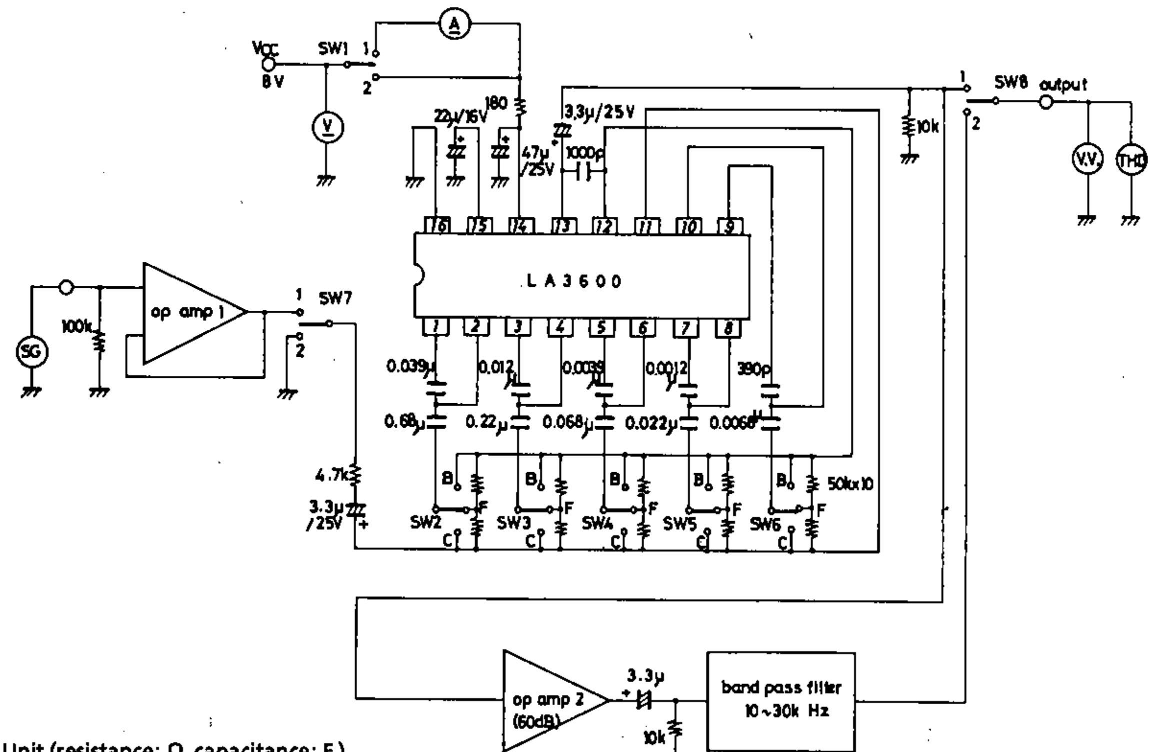
SANYO Electric Co., Ltd. Semiconductor Business Headquarters
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110 JAPAN



Test Method: V_{CC}=8V, R_L=10kΩ, R_g=600Ω

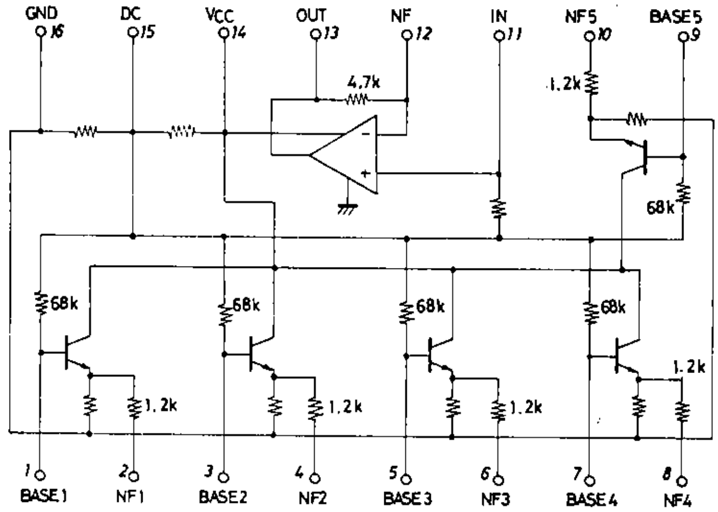
Item	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	Conditions
Icco	1	-	-	-	-	-	2	1	
VG	2	F	F	F	F	F	1	1	f=1kHz, Vin=-10dB
BOOST	2	B	F	F	F	F	1	1	f=100Hz
BOOST	2	F	B	F	F	F	1	1	f=340Hz
BOOST	2	F	F	B	F	F	1	1	f=1kHz
BOOST	2	F	F	F	B	F	1	1	f=3.4kHz
BOOST	2	F	F	F	F	B	1	1	f=10kHz
CUT	2	C	F	F	F	F	1	1	f=100Hz
CUT	2	F	C	F	F	F	1	1	f=340Hz
CUT	2	F	F	C	F	F	1	1	f=1kHz
CUT	2	F	F	F	C	F	1	1	f=3.4kHz
CUT	2	F	F	F	F	C	1	1	f=10kHz
THD	2	F	F	F	F	F	1	1	f=1kHz, Vo=1.0V
VNO	2	F	F	F	F	F	2	2	

Test Circuit



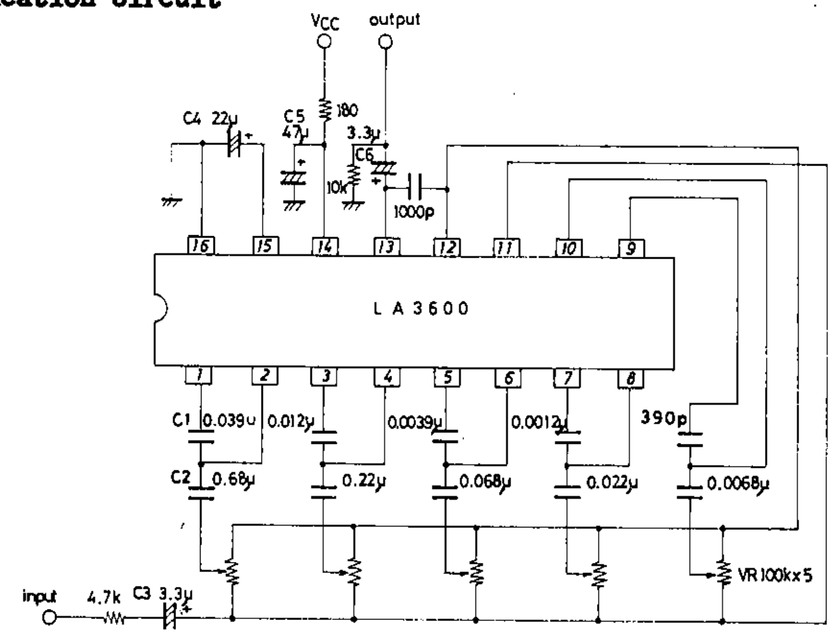
Unit (resistance: Ω, capacitance: F)

Equivalent Circuit Block Diagram



Sample Application Circuit

Unit (resistance: Ω, capacitance: F)



fo(resonance frequency)

In the sample application circuit, fo for each of 5 bands is set as follows:

fo=108Hz, 343kHz, 1.08kHz, 3.43kHz, 10.8kHz

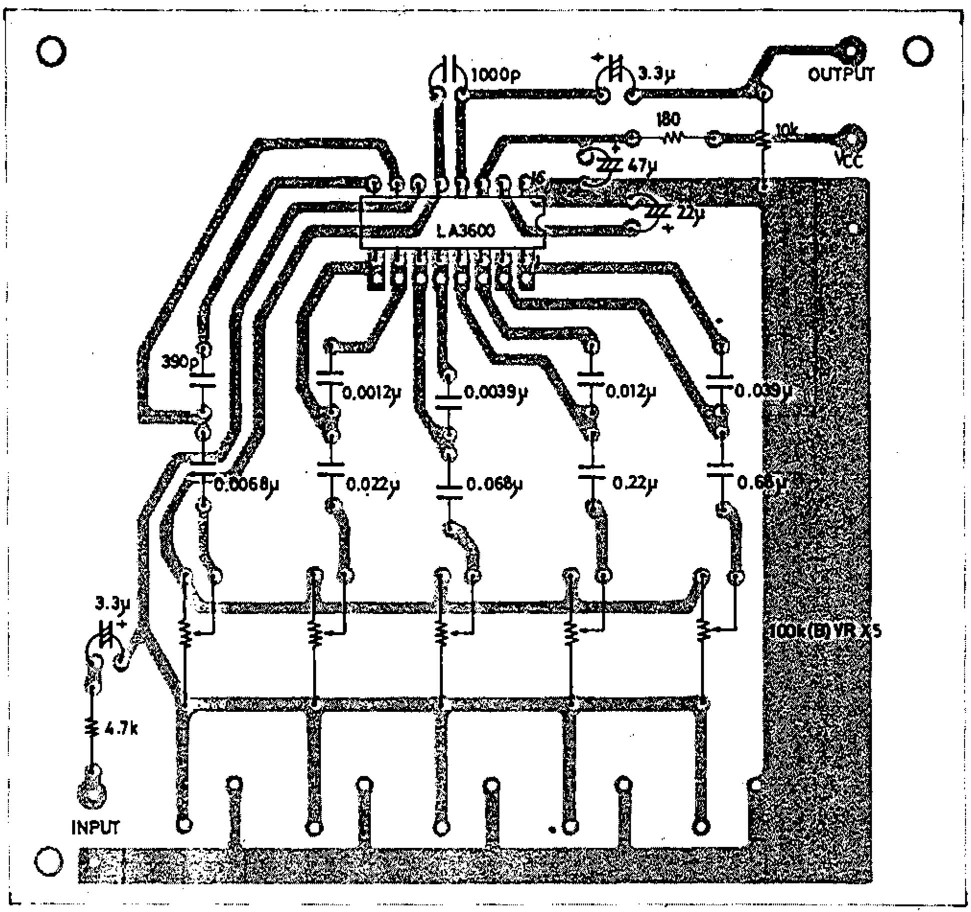
$$f_o = \frac{1}{2\pi\sqrt{C1, C2, R1, R2}}$$ (R1=1.2kohms,R2=68kohms on-chip resistor)

Description of external parts

- C1,C2 : Capacitors used to fix fo (resonance frequency)
- C2 : Input capacitor. Decreasing the capacitor value lowers the frequency response at low frequencies.
- C3 : Input capacitor. Decreasing the capacitor value lowers the frequency response at low frequencies.
- C4 : Decoupling capacitor. Decreasing the capacitor value makes the effect of power supply stronger, whereby ripple is liable to occur.
- C5 : Power capacitor.
- C6 : Output capacitor. Decreasing the capacitor value lowers the frequency response at low frequencies.

Sample Printed Circuit Pattern

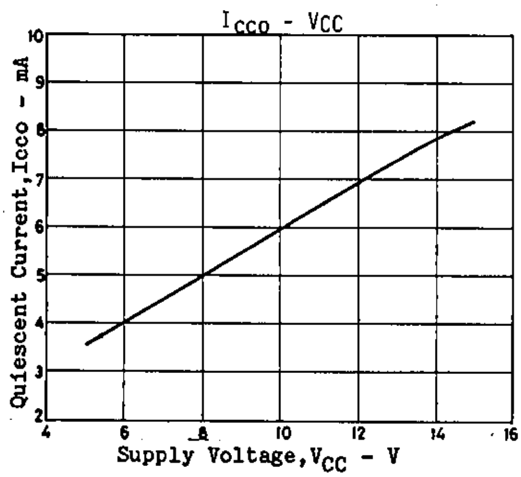
Unit (resistance: Ω, capacitance: F)

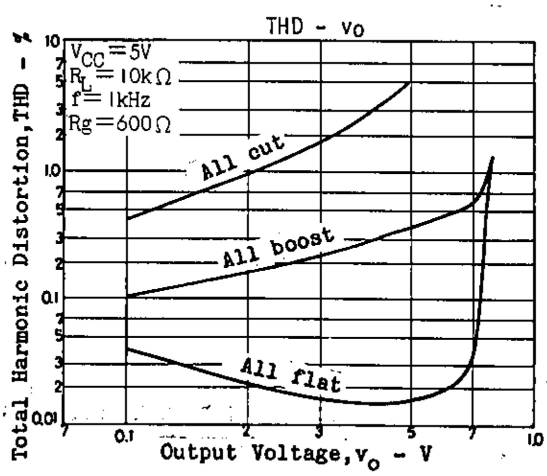


Cu-foiled area 110×102.5mm²

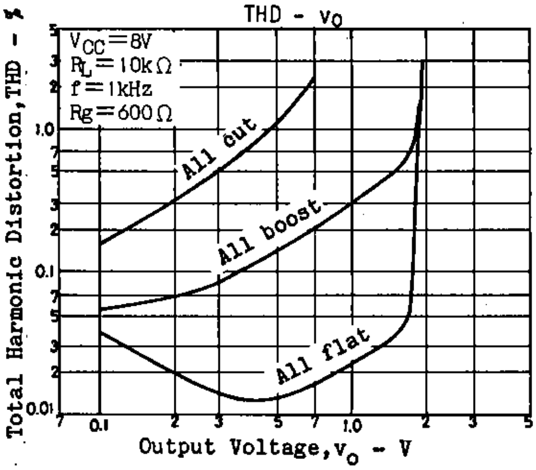
Proper cares in using IC

- Maximum supply voltage V_{CC}max 20V must not be exceeded. The operating voltage is in the range of 5 to 15V.
- Application of power with the pin-to-pin spaces shorted causes breakdown or deterioration of the IC to occur. When mounting the IC on the board or applying power, make sure that the pin-to-pin spaces are not shorted with solder, etc.

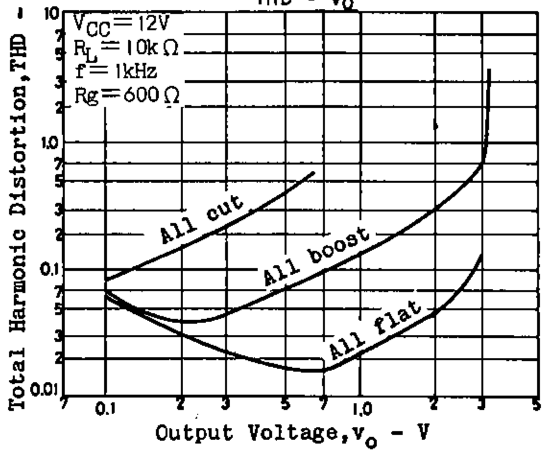




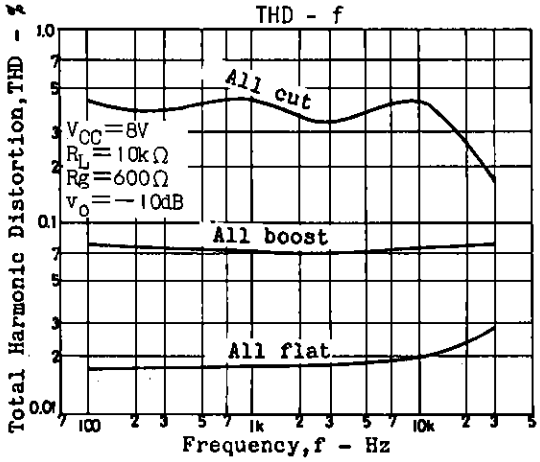
THD - v_O



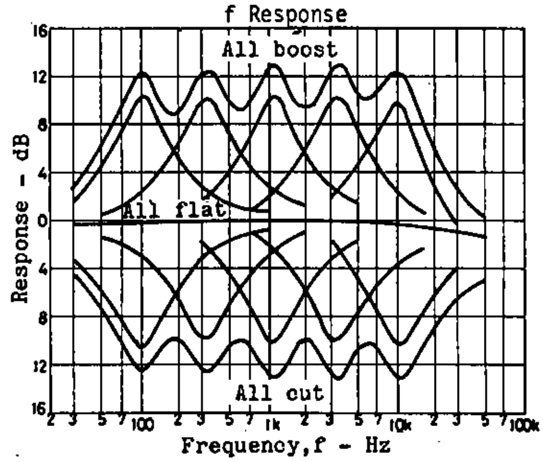
THD - v_O



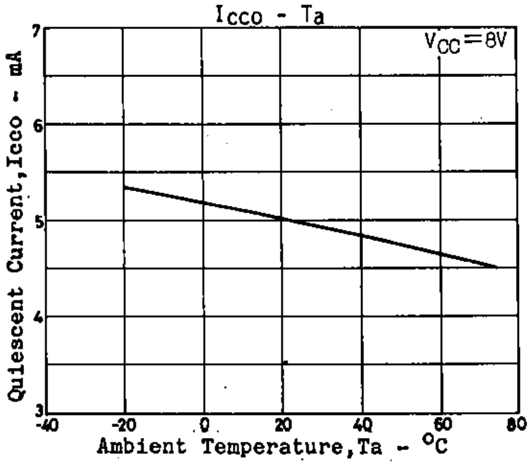
THD - f



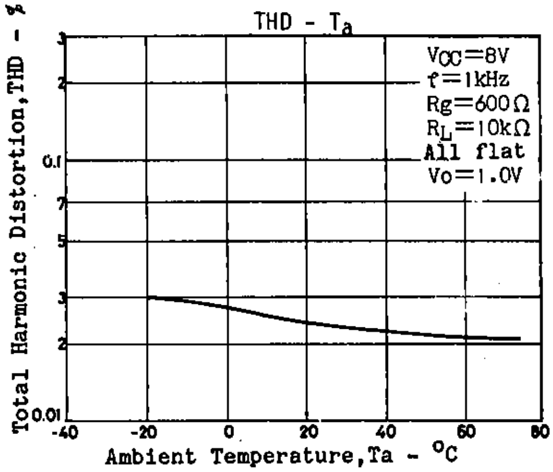
f Response



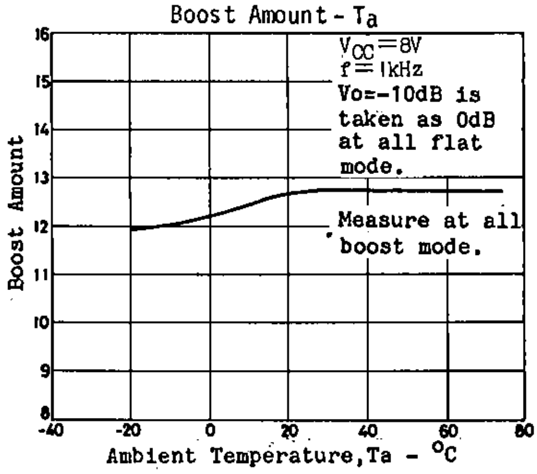
Icco - Ta



THD - Ta



Boost Amount - Ta



■ No products described or contained herein are intended for use in surgical implants, life-support systems, aerospace equipment, nuclear power control systems, vehicles, disaster/crime-prevention equipment and the like, the failure of which may directly or indirectly cause injury, death or property loss.

■ Anyone purchasing any products described or contained herein for an above-mentioned use shall:
① Accept full responsibility and indemnify and defend SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors and all their officers and employees, jointly and severally, against any and all claims and litigation and all damages, cost and expenses associated with such use:
② Not impose any responsibility for any fault or negligence which may be cited in any such claim or litigation on SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors or any of their officers and employees jointly or severally.

■ Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.